National Institute of Environmental Health Sciences

Respiratory symptoms following wildfire smoke exposure: Airway size as a susceptibility factor

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Abstract:

BACKGROUND: Associations between exposure to smoke during wildfire events and respiratory symptoms are well documented, but the role of airway size remains unclear. We conducted this analysis to assess whether small airway size modifies these relationships. METHODS: We analyzed data from 465 nonasthmatic 16- to 19-year-old participants in the Children's Health Study. Following an outbreak of wildfires in 2003, each student completed a questionnaire about smoke exposure, dry and wet cough, wheezing, and eye symptoms. We used log-binomial regression to evaluate associations between smoke exposure and fire-related health symptoms, and to assess modification of the associations by airway size. As a marker of airway size, we used the ratio of maximum midexpiratory flow to forced vital capacity. RESULTS: Forty percent (186 of 465) of this population (including students from 11 of 12 surveyed communities) reported the odor of wildfire smoke at home. We observed increased respiratory and eye symptoms with increasing frequency of wildfire smoke exposure. Associations between smoke exposure and having any of 4 respiratory symptoms were stronger in the lowest quartile of the lung function ratio (eg, fire smoke 6+ days: prevalence ratio: 3.8; 95% confidence interval (CI Euro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 2.0-7.2), compared with the remaining quartiles (fire smoke 6+ days: prevalence ratio Euro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 2.0; 1.2-3.2). Analysis of individual symptoms suggests that this interaction may be strongest for effects on wheezing. CONCLUSIONS: Small airways may serve as a marker of susceptibility to effects of wildfire smoke. Future studies should investigate the role of airway size for more common exposures and should include persons with asthma.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Extreme Weather Event

Extreme Weather Event: Wildfires

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location: ☑

resource focuses on specific location

United States

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Respiratory Effect

Respiratory Effect: Other Respiratory Effect

Respiratory Condition (other) : respiratory and eye symptoms

Population of Concern: A focus of content

Population of Concern: ☑

populations at particular risk or vulnerability to climate change impacts

Children

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified